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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/753,138	01/07/2004	Francesco De Rege Thesauro	100185	4430
29050	7590	02/24/2006		
STEVEN WESEMAN ASSOCIATE GENERAL COUNSEL, I.P. CABOT MICROELECTRONICS CORPORATION 870 NORTH COMMONS DRIVE AURORA, IL 60504			EXAMINER MULLER, BRYAN R	
			ART UNIT 3723	PAPER NUMBER

DATE MAILED: 02/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/753,138

Applicant(s)

DE REGE THESAURO ET AL.

Examiner

Bryan R. Muller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 6-10, 13-19, 21 and 32-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-10, 13-19, 21 and 32-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/13/2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 6-9, 13-19, 21, 32-37 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ina et al (6,139,763) in view of Hartner et al (2002/0086511).
3. In reference to claim 1, Ina discloses a polishing composition for use in a CMP polishing system, wherein the method of use comprises, providing a substrate comprising a metal in oxidized form (tantalum oxide), contacting a portion of the substrate with a CMP polishing system comprising a polishing pad (col. 10, lines 34-37) and a polishing composition (with water as a liquid carrier) with abrasive particles (abstract) and a reducing agent (abstract) therein and abrading at least a portion of the metal oxidized form to polish the substrate. Ina further discloses that the reducing agent may be formic acid or formaldehyde (col. 6, lines 29-32). Ina however fails to disclose that the metal in oxidized form may be a noble metal selected from the group consisting of platinum, iridium, ruthenium, rhodium, palladium, silver, osmium, gold and combinations thereof. Hartner discloses a method for fabricating a patterned layer on a substrate that incorporates a step of chemical mechanical polishing a layer of iridium oxide (paragraphs 43 and 44) to produce a layer on the substrate that is self-aligned

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and self-patterned. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the oxidized metal to be polished in the method of Ina may have been iridium oxide as used in the method of Hartner to produce a layer on the substrate that is self-aligned and self-patterned. This would have been advantageous because the pattern would not have to be etched, which is difficult and creates another step in the process, thus saving time and increasing production.

4. In reference to claim 2, the obvious combination of Ina and Hartner discloses polishing a substrate comprising iridium oxide, which is an oxide form of oxidation.

5. In reference to claim 3, the molecular formula for iridium Oxide is "IrO₂", which is equivalent to Ir₁O₂. Therefore, in the form M_xO_y, y is greater than x.

6. In reference to claim 6, the obvious combination of Ina and Hartner discloses polishing a substrate comprising iridium oxide, as discussed supra.

7. In reference to claims 7-9, 13 and 14, Ina discloses that the reducing agent may be formic acid, as discussed supra, and that the abrasive disposed in the liquid carrier may be silica or fumed alumina (Col. 4, lines 16-22).

8. In reference to claims 10, 15 and 19, Ina further discloses that the abrasive may be α-alumina (Col. 4, line 19).

9. In reference to claims 16-18, Ina discloses that the abrasive suspended in the liquid carrier (slurry), may include silica or fumed alumina, as discussed supra.

10. In reference to claim 21, Ina discloses that the reducing agent may comprise between 0.002 and 0.1 mol/L of the complexing solution (Col. 4, lines 44-47). Using the molecular weight of formic acid (46.03 g/mol) and the fact that one Liter of water weighs

approximately 1000g, it can be calculated that the % weight of the reducing agent in the composition is approximately between 0.092 and 0.46% by weight. This range overlaps the claimed range and thus, anticipates the claimed range (see MPEP § 2131.03 [R-2]).

11. In reference to claim 32, Ina further discloses that the liquid carrier may be water (abstract).

12. In reference to claim 33, Ina further discloses that the CMP system comprises a chelating agent (col. 7, lines 15-26), which is the same as a complexing agent, as disclosed by the applicant in paragraph 28 of the specification.

13. In reference to claim 34, Ina further discloses that the CMP system comprises a pH-adjusting agent to improve stability of the polishing composition (col. 8, lines 53-57). The definition of buffering is "a substance that minimizes change in the acidity of a solution when an acid or base is added to the solution" (*The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2000 by Houghton Mifflin Company. Published by Houghton Mifflin Company. All rights reserved.*), thus the pH-adjusting agent, as disclosed by Ina, is a pH buffering agent in that it improves stability.

14. In reference to claim 35, Ina discloses that the composition may comprise surfactants (col. 8, line 53-55).

15. In reference to claims 36 and 37, the obvious combination of Ina and Hartner discloses the polishing method, as discussed supra in reference to claim 1, and Ina further discloses that the reducing agent may be present in the amount of 0.092-0.46

wt% based on the weight of the liquid carrier and any components dissolved or suspended therein, as discussed supra with reference to claim 21.

16. In reference to claim 39, the obvious combination of Ina and Hartner discloses the polishing method, as discussed supra in reference to claim 1, and Ina further discloses that the polishing component **may** comprise abrasive particles of α -alumina or fumed alumina, and provides several other abrasives that may be used. Thus, the polishing system, as disclosed by Ina may have several embodiments that do not comprise a mixture of α -alumina and fumed alumina.

17. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sun et al (2002/0090820) in view of Hartner et al (2002/0086511) and Ina et al (6,139,763).

18. Sun discloses a method for polishing a metal in an oxidized form comprising the steps of providing a substrate comprising a metal in oxidized form (paragraph 31 discloses that the substrate may comprise silicon dioxide, wherein silicon is a semi-metallic element and silicon dioxide is an oxidized form of silicon, thus an oxidized metal), contacting a portion of the substrate with a CMP polishing system (paragraph 23) comprising a polishing element of abrasive particles and/or a polishing pad (abstract), a reducing agent (that may be oxalic acid; paragraph 50) and a liquid carrier (water) and abrading at least a portion of the metal in an oxidized form to polish the substrate. Sun further discloses that the polishing system **may** comprise an oxidizing agent (chelating agent), thus the polishing system, as disclosed by Sun does not require an oxidizing agent and would therefore have at least one embodiment that does not

contain an oxidizing agent. Sun, however, fails to disclose that the metal in an oxidized form is a noble metal selected from the claimed group or that the reducing agent is one of the reducing agents from the claimed group. Hartner discloses a method for fabricating a patterned layer on a substrate that incorporates a step of chemical mechanical polishing (CMP) a layer of iridium oxide (paragraphs 43 and 44) to produce a layer on the substrate that is self-aligned and self-patterned. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the oxidized metal to be polished in the method of Sun may have been iridium oxide as used in the method of Hartner to produce a layer on the substrate that is self-aligned and self-patterned. This would have been advantageous because the pattern would not have to be etched, which is difficult and creates another step in the process, thus saving time and increasing production. Further, Ina discloses a method of polishing a substrate comprising a metal in oxidized form, as discussed supra, that is similar to the method of Sun, both of which are intended to be used on substrates comprising tantalum. Ina further discloses that suitable reducing agent for such a substrate are formic acid, formaldehyde and oxalic acid (Col. 6, lines 30-33), thus teaching that formic acid and formaldehyde are possible equivalents of oxalic acid for acting as a reducing agent in a polishing compound for a substrate comprising tantalum and a metal in oxidized form. Therefore, it further would have been obvious to one of ordinary skill in the art at the time the invention was made that formic acid or formaldehyde may be used in place of oxalic acid as a reducing agent in the polishing composition.

Response to Arguments

19. Applicant's arguments with respect to claim rejections based on the Li et al (2002/0182982) reference have been considered but are moot in view of the new ground(s) of rejection.

20. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Applicant argues that there is no motivation to combine Li et al (or Ina et al) and Hartner et al because the Li (or Ina) composition would not be sufficient to polish noble metals because of their material properties and that Hartner does not disclose anything that would imply that the Li (or Ina) CMP process could polish the barrier material of iridium oxide. However, the teachings of Hartner provides motivation to use the disclosed process with any substrate to produce a patterned layer, which would remove the need for an etching step to form the pattern, which would save time and increase production, as discussed supra. Further, the fact that the Hartner reference does not disclose any special CMP process is necessary to polish the iridium oxide layer (is silent to the details of the CMP step), makes it obvious to one of ordinary skill in the art that any CMP process, especially that of Li (or Ina), which is intended to be used on substrates comprising

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metals in oxidized form, would be sufficient to process the iridium oxide layer of Hartner in the process disclosed by Hartner.

Conclusion

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kitayama (Pub. No. 2004/0132385) and Beitel (Pub. No. 2002/0042208) all disclose methods for polishing materials using polishing compositions comprising materials similar or the same as those disclosed in the application.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bryan R. Muller whose telephone number is (571) 272-4489. The examiner can normally be reached on Monday thru Thursday and second Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph J. Hail III can be reached on (571) 272-4485. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BRM *BRM*
2/15/2006



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